

REMARKS/ARGUMENTS

The Applicants appreciate the Examiner's comments, and amendments to the specification and figures are made to clarify the relationship between the first and second electrodes and the vias through the substrate. The first paragraph of the detailed description on page 3, lines 2-15, is amended as shown herein. The amended paragraph clarifies that the "liquid metal" top contacts 30 and 31 are conductive and electrically insulated from one another by insulation dams 32, 33, 34. These liquid metal top contacts 30 and 31 are both electrically and thermally conductive. This is consistent with the use of the words "electrode" and "contact" in the specification. In relation to the electrical arts, a contact is a connection for passage of electric current. Thus, it is necessary to insulate each of the electrical connections from the other by insulation dam 33. This understanding of the electrical conductivity of the "liquid metal" mold cap is supported by the paragraph on page 2, lines 4-7. This paragraph describes the liquid metal mold cap as a conductive metal-filled epoxy, which "is provided with vertical insulation barriers separating the top contacts of selected chips while still improving DFPR." By eliminating the need for a bond wire between drain electrode 22 and drain connection 13, for example, DFPR is improved. Also, the conductive or liquid metal electrode may be cast with fins to improve cooling. Thus, the top contacts are both electrically conductive to improve DFPR electrodes and thermally conductive to improve cooling.

In response to the Examiner's objection to the drawings under 37 C.F.R. §1.83(a), the amended drawings now explicitly show a schematic electrode 22 on the top of dies 20 and 21 that was inherently present previously. This is supported on page 3, lines 9-15 of the specification. Thus, Fig. 1 now shows a first electrode 22 and at least one second electrode 14, 15 (MULTI SOURCE CONNECTION) on a top and bottom surface of a chip (dies 20 and 21). The Applicants traverse the Examiner's objection based on failure to disclose vias through the substrate, because vias are well known in the art and are adequately described on page 3, lines 3-6, of the specification, as "conductive vias (not shown) connecting conductive electrodes such as electrodes 13, 14, 15 on the top of substrate 10 to respective BGA solder balls on the bottom of the substrate, such as BGA solder balls 16, 17 and 18. Thus, a cross-sectional view of the vias or a figure showing hidden lines is not essential for a proper understanding of the disclosed

invention. Fig. 2 has also been amended by adding a label to one of the wire bonds and to the bottom surface of a chip.

The Examiner rejects claims 1-3, 5, 6, 9-16 and 18-22 under 35 U.S.C. §112, first paragraph. As now amended, the specification fully supports the claim language. Specifically, "a flip-chip semiconductor die having top and bottom surfaces and having at least first and second electrodes on said top and bottom surfaces" is supported by Figs. 1-4 and on page 3, lines 6-15, and page 3, line 26 to page 4, line 2. For example, electrode 22 of Fig. 1 is a first electrode and the electrode connected to the contact designated "MULTI SOURCE CONNECTION" is a second electrode, which are located on the top and bottom of flip-chip semiconductor die 20. In another example, wire bond 43 in Fig. 2 connects an electrode on the top of die 41 to contact 14, and electrode 44 on the bottom of die 41 is connected electrically to contact 15. Furthermore, "a moldable conductive electrode extending over the top of said substrate and over the uppermost surfaces of said die and in contact therewith" is shown in Fig. 1 and supported by the specification at page 3, lines 6-15. Also, "an insulation cap covering said die and covering the top surface of said substrate" is shown in Figs. 2-4 and supported in the specification at page 3, lines 25-26.

The Examiner rejects claims 1-3, 5, 6, 9-16 and 18-22 under 35 U.S.C. §112, second paragraph. The term "electrode" in claim 1 is used in the claim to mean a conductive electrode, which is supported in the specification on page 2, lines 6-7, and page 3, lines 9-11. Thus, the term "electrode" is given the usual meaning of that term, and the moldable conductive electrode does function to establish an electrical contact. Copper or silver powder filled epoxies are now being used as lead-free solder to connect leads from semiconductor devices to printed wire boards, for example. These copper or silver powder filled epoxies are both electrically and thermally conductive.

The Applicants respectfully request that the amendments to the figures and specification be entered. Claims 1-3, 5, 6, 9-16 and 18-22 are now in condition for allowance.

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Signature

April 11, 2003

Date of Signature

Respectfully submitted,



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